CLAIMS

What is claimed is:

1. A chemical mechanical polishing apparatus for polishing a layer on a wafer, comprising:

a base;

a plurality of polishing heads disposed above said base for engaging the wafer;

a plurality of polishing pads or belts carried by said base for polishing the layer;

a metrology tool carried by said base between a pair of adjacent ones of said plurality of polishing pads or belts for measuring a thickness of the layer; and

a controller operably connected to said plurality of polishing pads or belts and said metrology tool for operating at least one of said plurality of polishing pads or belts responsive to input from said metrology tool.

2. The apparatus of claim 1 wherein said plurality of polishing pads or belts comprises a first polishing pad, a second polishing pad and a third polishing pad rotatably carried by said base.

3. The apparatus of claim 1 wherein said plurality of polishing heads comprises at least four polishing heads.

4. The apparatus of claim 3 wherein said plurality of polishing pads or belts comprises a first polishing pad, a second polishing pad and a third polishing pad rotatably carried by said base.

5. The apparatus of claim 1 further comprising a load/unload station carried by said base for loading the wafer on and unloading said wafer from said plurality of polishing heads.

6. The apparatus of claim 2 wherein said metrology tool is interposed between said second polishing pad and said third polishing pad.

7. A chemical mechanical polishing apparatus for polishing a layer on a wafer, comprising:

a base;

a plurality of polishing heads disposed above said base for engaging the wafer;

first, second and third polishing pads or belts carried by said base for polishing the layer;

a metrology tool carried by said base between said first polishing pad and said second polishing pad for measuring a thickness of the layer; and

a controller operably connected to said polishing pads or belts and said metrology tool for operating at least one of said second polishing pad or belt and said third polishing pad or belt responsive to input from said metrology tool.

8. The apparatus of claim 7 wherein said plurality of polishing heads comprises at least two polishing heads.

9. The apparatus of claim 7 further comprising a load/unload station carried by said base for loading the wafer on and unloading said wafer from said plurality of polishing heads.

10. The apparatus of claim 9 wherein said plurality of polishing heads comprises at least two polishing heads.

11. A method of polishing a layer on a wafer, comprising the steps of:

providing a plurality of polishing pads or belts for polishing the layer and a metrology tool between a pair of adjacent ones of said plurality of polishing pads or belts for measuring a thickness of the layer;

polishing the layer on at least a first one of said plurality of polishing pads or belts;

measuring the thickness of the layer by operation of said metrology tool; and

polishing the layer to a target thickness on at least a second one of said plurality of polishing pads or belts.

12. The method of claim 11 wherein:

said plurality of polishing pads or belts comprises first, second and third polishing pads or belts;

said metrology tool is interposed between said second polishing pad or belt and said third polishing pad or belt;

said polishing the layer on at least a first one of said plurality of polishing pads or belts comprises polishing the layer on said first polishing pad or belt and said second polishing pad or belt; and

said polishing the layer to a target thickness on at least a second one of said plurality of polishing pads or belts comprises polishing the layer to a target thickness on said third polishing pad or belt.

13. The method of claim 11 wherein:

said plurality of polishing pads or belts comprises first, second and third polishing pads or belts;

said metrology tool is interposed between said first polishing pad and said second polishing pad;

said polishing the layer on at least a first one of said plurality of polishing pads or belts comprises polishing the layer on said first polishing pad or belt; and

said polishing the layer to a target thickness on at least a second one of said plurality of polishing pads or belts comprises polishing the layer to a target thickness on said second polishing pad or belt and said third polishing pad or belt.

14. The method of claim 11 wherein said layer is a dielectric material and said target thickness is from about 300 to about 20,000 angstroms.

15. The method of claim 11 wherein said layer is a metal layer and said target thickness is from about 500 angstroms to about 5 μm.

16. The method of claim 11 further comprising the step of subjecting the wafer to a post-CMP clean process using an in-situ polish clean tool.

17. The method of claim 11 further comprising the step of subjecting the wafer to a post-CMP clean process using an ex-situ polish clean tool.

18. The method of claim 11 further comprising a controller connected to said plurality of polishing pads or belts and said metrology tool, and further comprising the steps of transmitting a feedback signal corresponding to the thickness of the layer from said metrology tool to said controller and an adjustment signal from said controller to said at least a second one of said plurality of polishing pads or belts, wherein said at least a second one of said plurality of polishing pads or belts polishes said layer to said target thickness according to said adjustment signal.

19. The method of claim 11 further comprising a controller connected to said plurality of polishing pads or belts and said metrology tool, and further comprising the steps of transmitting a feedback signal corresponding to the thickness of the layer from said metrology tool to said controller and an adjustment signal from said controller to said at least a first one of said plurality of polishing pads or belts, wherein said at least a first one of said plurality of polishing pads or belts polishes said layer to said intermediate target thickness according to said adjustment signal.

20. The method of claim 11 further comprising the steps of providing a plurality of wafers having a plurality of layers, respectively; and sequentially polishing the plurality of layers on said at least a first one of said plurality of polishing pads or belts, measuring the thicknesses of said plurality of layers, respectively, by operation of said metrology tool, and polishing the plurality of layers to a target thickness on said at least a second one of said plurality of polishing pads or belts, respectively.

21. The method of claim 11 further comprising the step of verifying said target thickness of the layer by subjecting the layer to a post-CMP thickness measurement.